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REPORT 2

# A STUDY OF THE IMPACT OF POLLUTION STANDARDS AND CHARGES ON THE BAKERY INDUSTRY

FOR THE

COUNCIL ON ENVIRONMENTAL QUALITY

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# A STUDY OF THE IMPACT OF POLLUTION STANDARDS AND CHARGES ON THE BAKERY INDUSTRY (PART III)

COUNCIL ON ENVIRONMENTAL QUALITY

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# INTRODUCTION

In late September the Council on Environmental Quality engaged Ernst & Ernst to study the consequences of pollution abatement requirements for the bakery industry. Ernst & Ernst's task was to use the Environmental Protection Agency's estimates of pollution costs and our investigation of the bakery industry to determine these consequences. This third part of the report presents a detailed analysis of the economic impact of pollution abatement upon the industry, particularly the costs of pollution control. Since the Council on Environmental Quality requested that Part II not include any speculation about the economic impact of pollution costs, the preliminary findings of Part II are included here.

(Part I). An executive summary that presents pertinent industry structure and trends and the quantitative and qualitative findings concerning the economic impacts on the industry of abatement control expenditures.

(Part II). A description of the structure of the industry, an analysis of the industry detailing industry characteristics and trends that are relevant to the economic analysis of the effects of pollution abatement costs on the industry.

(Part III). A detailed analysis of the economic impact of pollution abatement upon the industry, particularly the costs of pollution control. Since the Council on Environmental Quality requested that Part II not include any speculation about the economic impact of pollution costs, the preliminary findings of Part II are included in Part III.

This report represents Part III of the study.

## SUMMARY

Because of the relatively low water discharge usage of the bakery industry and the low costs of abatement, the impact of pollution control costs is likely to be very insignificant.

- Total industry water discharge is approximately 4 billion gallons per year.
- Abatement costs in the most expensive year (1976) are estimated by EPA to be $4.84 million.
- It is estimated that industry sales will total approximately $9 billion in 1976 (US Department of Commerce).
- The costs of pollution abatement would thus raise costs $.00054 per dollar of sales, given present price trends.
- Abatement costs would have to be 1000 percent higher in order to increase bakery prices 1 cent.

## PRELIMINARY DISCUSSION OF THE IMPACT ON THE INDUSTRY
## (Part II Conclusions)

The overall impact of pollution abatement costs on the bakery industry is likely to be minimal as long as the costs are not exceptional. The evidence of the cost data supplied by the Environmental Protection Agency suggests that costs will not be extraordinary. This section discusses the impact of increased pollution control costs on prices, factors of production, related industries, and the industry itself.*

### Price Effects

Since the industry is not significantly affected by imports and since there are few close substitutes for bakery products, the cost of pollution control will be passed forward to the public. In fact, since the industry typically utilizes markup pricing, prices are likely to increase by more than the rise in costs.

Since all producers of the same product are able to compete regardless of size, technology, or finances it is unlikely that low-cost producers will price high-cost producers out of the market. The potential for this exists since capacity is adequate given a shift to 24-hour production; however, marketing strategies, established routes, etc., are likely to preclude this.

There is, however, a likelihood that the long-run trend toward industry concentration might be accelerated by large cost increases. Nevertheless the short-run effects are not likely to include a large number of plant closures.

### Factor Dislocations

In light of the above discussion of the likely industry response to increased costs it seems highly unlikely that many plants will shut down or reduce the scale of their operations. Some cost cutting might result to the extent that existing firms will be influenced even more toward automation and toward the elimination of the driver-salesman.

Profitability is not likely to be affected since firms have the capability to pass cost increases forward. Alternatively, the moderate but stable earnings of the bakery industry make bakery firms good loan risks, hence capital availability is not likely to be a problem. Cash flow in the industry is quite stable, debt positions are not out of line, and credit ratings are good, thus financing of capital devoted to pollution control is not likely to pose substantial problems.

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* Specific statistical and analytic information supporting these and subsequent conclusions appear in Appendix B.

## Effects on Related Industries

The effects upon related industries of increased costs for pollution control are likely to be small, with any effects impacting upon the customers rather than the suppliers.

Impact on Suppliers. Since the volume of bakery goods is not likely to decrease significantly because of moderate price increases, the impact upon industry suppliers will be minimal.

Impact on Customers. The impact upon the customers (retailers) of the bakery industry is likely to be limited to a higher price. In the case of the home-service bakeries, of course, the impact will bypass retailers. There may be some shift toward larger sales through grocery chains where prices are lower but this is not likely to be very large. Bakery customers, for the most part, can pass the cost increases forward to ultimate consumers. Furthermore, bakery products make up a small proportion of food retail sales, thus the impact upon the food retailing industry will be small.

## Industry Dislocation

There is little likelihood of industry dislocations since the cost increases will be small. Industry growth has been slow (about half the rate of population growth) and would not seem to be affected by the cost increases.

Since bakery products make up a small part of food purchases, national prices are not likely to be affected severely. There will likely be no meaningful balance-of-payments effects from the cost increases since imports and exports of baked goods are small. Capital and investment markets are not likely to be significantly affected because of the small size of the industry and the small increase in costs noted in the EPA cost analysis.

## Summary

For reasons of the small costs involved in bakery pollution control and the inelasticity of demand for baked goods, the effect of pollution control costs upon bakeries is likely to be minimal. The primary effect, if any, will be higher prices for bakery products to the consumer

## DETAILED ANALYSIS OF THE EFFECT OF ABATEMENT COSTS

This section amplifies the preliminary finding in Part II of the study. The discussion considers the feasibility of industry segmentation, relevant industry trends, an analysis of the economic impact of abatement costs and a discussion of the location of such impacts.

### INDUSTRY SEGMENTATION

The most relevant segmentation of the bakery industry is into (1) the bread, cake, and related products industry (SIC 2051) and (2) the biscuit and cracker industry (SIC 2052). Within these two segments the industry should be classified by plant size related to amount of waste water discharge. A bakery that produces 100,000 pounds per day is considered large, deriving from the perishable nature of the products (SIC 2051) and their fragility in shipment. The producing plants of the industry tend to be distributed widely across the country because short shipping distances are required. However, plant sizes remain relatively small even though the firms (particularly in the biscuit and cracker industry) may be large.

The resulting classification is shown in Table 1. The table reveals that there is no plant in either industry that discharges 10 million gallons a day (mgd). In fact total industry discharge averages only 15.4 mgd for both SIC 2051 and SIC 2052 combined.

Since the relevant segmentation in the industry is by plant, not firm, balance sheets and income statements for the multiplant firms are not revealing. In addition, the large bakery firms are often diversified (ITT-Continental; Nabisco) and thus the balance sheets and income statement are composits of financial data from baking and nonbaking operations. The small firms, on the other hand, are often proprietorships or nonpublic corporations, hence there is little published data on the finances of such firms. Finally, abatement costs are expected to have little effect upon the financial operations of the industry so that these effects will not significantly alter the financial statements.

Little variation in water discharge by product line, technology, or age of plant can be detected with available data. Size alone seems to be the determinant of water discharge. This is a tentative conclusion based upon interviews with industry representatives. The state of the data on volume of waste water discharge is very poor.

### INDUSTRY TRENDS

Several trends are in evidence in the bakery industry. While these trends are not expected to be changed by the impact of pollution control costs, it is worth while to detail them in case a decision is made to require a higher level of pollution control at a much higher cost.

TABLE 1

WASTE WATER DISCHARGES BY INDUSTRY SEGMENT

| Plant size | Average daily product (lbs) | Average daily discharge (mgd) |
|---|---|---|
| **Bread, Cake, and Related Products (SIC 2051)** | | |
| Largest existing | 1,360,000 | .15 |
| Large | 909,000 | .1 |
| Medium | 90,000 | .01 |
| Small | 9,000 | .001 |
| **Cookie (Biscuit) and Cracker Industry (SIC 2052)** | | |
| Largest existing | 930,000 | .40 |
| Large | 204,000 | .1 |
| Medium | 20,400 | .01 |
| Small | 2,040 | .001 |

* Data developed from Census of Manufacturers, 1967, 1963, 1958, 1953

Value of Shipments

The value of shipments is expected to increase in the future. The US Department of Commerce forecasts show the following forecasts of values of shipments (in billions of dollars): *

| | 1975 | 1980 |
|---|---|---|
| SIC 2051 | 6.7 | 9.0 |
| SIC 2052 | 2.0 | 2.5 |

* "US Industrial Outlook 1971," Department of Commerce

However, almost all of the increase in the value of shipments for SIC 2051 can be expected to come in the form of price increases. The biscuit and cracker industry (SIC 2052) is expected to undergo some real growth but again most of the increase in value will come from price increases. These conclusions are drawn from extrapolating the trends in value of shipments in current dollars and the value of shipment in constant dollars. The latter trend exhibits very slow growth (about half the rate of the increase in population) in the bread and related products industry. Thus we expect that real growth in output will continue to be low.

The trends in the biscuit and cracker industry showed more real growth in the past years, but again a significant proportion of the increase in the value of shipments comes in the form of price increases (see Figure 1 in Report 1).

Return on Investment (ROI)

The rate of return on investment took a downward turn in 1969 and can be expected to continue to fall for the near future. This expectation is based upon the fact that the industry is continuing the trend toward installation of high-speed automated equipment.* This will increase capitalization and, because of the low growth in sales, a lower ROI. However, as inflation subsides ROI may stabilize and even exhibit moderate increases after 1972-1973.

The ROI is not unduly low in this industry: 13.4 percent in 1968, 10.2 percent in 1969. However, the profit margin on sales is small and may become smaller; 3.2 percent in 1968, 2.5 percent in 1969. This can cause problems in the industry as firms strive to increase their share of a relatively static market.

Employment

As automation increases the number of production workers in the bread and related products industry can be expected to decline from the present level of 125,000 while the number of delivery men is expected to increase as the industry improves its distribution system. The biscuit and cracker industry is likely to show continued growth in employment as the demand for its products grows. However the 1 percent per year growth in employment in the industry is not likely to continue after 1972 because of the slow growth in population and pressures toward automation.**

Concentration

The trend toward concentration in the baking industry is likely to continue as the introduction of more automated equipment places heavy capital

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* Comment in "US Industrial Outlook, 1971," US Department of Commerce, pp 102-103

** Ibid.

demands on the industry. Table 2 shows the concentration ratios and number of firms for past years. It is obvious that concentration in the bread and related products industry is increasing. However the biscuit and cracker industry seems to have experienced little change in concentration in the recent past.

TABLE 2

CONCENTRATION IN THE BAKERY INDUSTRY *

| Year | Number of firms | Percent of shipment accounted for by: | | | |
|---|---|---|---|---|---|
| | | 4 Largest | 8 Largest | 20 Largest | 50 Largest |
| SIC 2051 | | | | | |
| 1967 | 3445 | 26 | 38 | 47 | 58 |
| 1963 | 4339 | 23 | 35 | 45 | 56 |
| 1958 | 5305 | 22 | 33 | 42 | 51 |
| 1954 | 5470 | 20 | 31 | 40 | NA |
| 1947 | 5985 | 16 | 26 | 36 | NA |
| SIC 2052 | | | | | |
| 1967 | 286 | 59 | 70 | 82 | 91 |
| 1963 | 286 | 59 | 68 | 80 | 91 |

*"US Census of Manufacturers 1967," Bureau of the Census

Summary of Industry Trends

Because of the small increases in costs brought about by abatement activities the trends now observable in the industry are expected to continue unchanged. Thus the forecast for the industry ex post the setting of environmental standards is the same as the baseline forecast.

IMPACT ANALYSIS

The Environmental Protection Agency (EPA) provided Ernst & Ernst with a cost model for pollution control in the bakery industry. This document (included as Appendix A) was used to determine the impact of cost increases on the bakery industry.

Using the cost model logic and data for industry water discharge, industry production volume, industry product value, and other industry statistics

result in the following findings:

Cost of Control by Industry Segment

The cost to control waste water pollution from a bakery of any size is very small; Table 3 gives the costs for plants of varying sizes based on the information provided.

TABLE 3

POLLUTION CONTROL COSTS BY INDUSTRY SEGMENT

| Average plant volume per day | Average daily discharge (mgd) | Cost of control | | |
|---|---|---|---|---|
| | | ¢ per pound | Annual | Investment† |
| | Bread and Related Products (SIC 2051) | | | |
| 1,360,000 | .15 | .02** | $ 74,100 | $ 60,600 |
| 909,000 | .1 | .02** | 49,400 | 40,400 |
| 90,000 | .01 | .011* | 2,600 | - |
| 9,000 | .001 | .011* | 260 | - |
| | Biscuits and Crackers (SIC 2052) | | | |
| 930,000 | .46 | .09** | $ 194,840 | $ 185,000 |
| 204,000 | .1 | .09** | 49,400 | 40,400 |
| 20,400 | .01 | .05* | 2,600 | - |
| 2,040 | .001 | .05* | 260 | - |

* At $ .10 per 100 gallons of discharge
** Using own facilities
† Assuming investment takes place over 5 years

These figures show that the cost of discharge for a plant is below the cost of treating its own waste during 1-5 years because the capital costs are amortized over this period. For the time period after year 5, having its own treatment plant would be cheaper because operation and maintenance costs are below discharge costs. Which alternative is preferred depends on the discount rate, time period considered, and the size of the initial investment. An analysis of which alternative is best, for a large bakery (.1 mgd discharge), is as follows:

(1) Interest rate = 7.7 percent, 1972 is year 0
(2) Cost stream for bakery using its own equipment is

    $40,400/yr for period 1972-1976, $9000 thereafter

(3) Cost stream for bakery using municipal sewerage system $26,000 per year at an effluent charge of $.10 per 100 gallons of discharge
(4) Present value of the cost streams over an infinite time horizon is:
    a) To build own facilities $290,983
    b) To use municipal sewer 337,000

Thus the present value of the cost streams is quite close, so that the choice of treatment made could easily be determined by other considerations. Additionally, construction assumes the land is free and available. However, many bakeries are in urban locations where the land needed for treatment facilities is unavailable or available only at a prohibitively high cost. In this case the bakery would be forced to choose the no-build option. Conversely, those bakeries located in rural areas where there is no municipal sewer system might have no other choice than to build their own treatment facilities. In either case, cost per pound of output is low.

If bakeries could utilize municipal sewerage systems at a cost lower than $ .10 per hundred gallons (an upper limit provided by EPA) they might choose the no-build option under all feasible conditions. The point at which the no-build option becomes attractive is approximately $ .086 per 100 gallons of discharge. At any effluent charge below this figure the no-build option becomes the preferred alternative.

Industry Effects

The costs of pollution abatement in the bakery industry are so low that any cost-based change in the price of bakery products is unlikely. A cost rise of 15/100 of a cent per dollar of sales for bakery products can easily be absorbed by the industry with no price increases for its products.

The returns on sales in the industry averaged 2.5 percent in 1969. Such an increase (.05¢) would reduce returns to 2.35 percent, a relatively small change. Only in the case where a bakery was almost ready to increase prices (1¢ per loaf for example) would such an increase occur. In this situation the effect of the cost increase would likely be to cause the increase to take place a little sooner than would otherwise be the case.

## Sensitivity Analysis

Since the costs, discharge levels, and other data may be inaccurate, it is necessary to perform a sensitivity analysis of the industry's reaction to varying levels of abatement cost.

The scenarios included in this sensitivity analysis are:

- Costs per pound are 50 percent higher than calculated.
- Costs per pound are 100 percent higher than calculated.
- Costs per pound are 1000 percent higher than calculated.

Costs 50 Percent Higher. A level of abatement costs 50 percent higher than calculated would raise costs of bakery products (in cents per pound (¢/lb), as shown in the following tabulations:

| | Estimated costs | Costs 50 percent higher | Approximate change |
|---|---|---|---|
| Bread, etc. (SIC 2051) | .011 - .02 | .015 - .03 | .007 |
| Biscuits, etc. (SIC 2052) | .05 - .09 | .075 - .14 | .033 |

Such cost increases could be expected to have little effect upon the industry's financial well being or its pricing policies based on production cost.

Costs 100 Percent Higher. A 100 percent increase in abatement costs over the calculated values results in the following costs (in ¢/lb):

| | Estimated costs | Costs 100 percent higher | Approximate change |
|---|---|---|---|
| Bread, etc. | .011 - .02 | .02 - .04 | .015 |
| Biscuits, etc. | .05 - .09 | .1 - .18 | .075 |

Again, such a cost increase could be expected to have a negligible impact upon the industry.

Costs 1000 Percent Higher. A 1000 percent increase in abatement costs results in the following cost figures (in ¢/lb):

| | Estimated costs | Costs 1000 percent higher | Approximate change |
|---|---|---|---|
| Bread, etc. | .01 - .02 | .1 - .2 | .135 |
| Biscuits, etc. | .05 - .09 | .5 - .9 | .65 |

If costs were indeed 1000 percent higher a small increase in bread prices might be expected where profit margins on sales in a particular area were low. No increase would be expected where margins are high. The biscuit and cracker industry could be expected to increase prices 1¢ per pound.

Since the industries face inelastic demand curves and can pass costs forward, these price increases would be unlikely to cause plant closures or a significant shift in market shares of existing firms. Even in the unlikely case that abatement charges are 1000 percent higher than now estimated, industry dislocations would likely be minimal, for the reasons stated in "Preliminary Discussion" at the beginning of this report. The most significant impact that might be expected would be a slight increase in the rate of concentration as larger bakeries take advantage of the cost reduction benefit from automation in response to increased costs.

Locational Effects

In light of the foregoing discussion, there is little likelihood that there will be differential locational effects. Since bakeries are located throughout the US in proportion to population, and since the effluent abatement costs per pound of output are so low, no differential locational impacts can be expected. This view is supported by the fact that the products are fragile and perishable, so that production facilities must remain close to the final market.

APPENDIX A

COST MODEL

Environmental Protection Agency

WATER POLLUTION ABATEMENT COSTS

Bakeries

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The costs reported in this document were calculated using a computer-based model developed to estimate the total costs (capital and operating) required by the nation's industries to attain water pollution control standards. The output of this model has been and will be published in EPA's report to Congress - Economics of Clean Water. However, the costs reported herein will not necessarily be the same as those in the 1972 Economics of Clean Water because some of the underlying assumptions may differ slightly.

The methodology built into the model to estimate both the total costs for the industry and the unit costs for individual establishments is discussed below.

Total Costs

Total costs were estimated by aggregating individual capital and operating cost figures for each establishment in the industry using over 10 million gallons per year. The methodology employed can be summarized in fourteen steps:

1. Identify establishments. The first step was to identify those establishments that discharge significant quantities of water (i.e., over 10 million gallons per year); 14,526 establishments were identified from the Census of Manufactures, 1963 and 1967.

2. Segment establishments. The next step was to segment these establishments into groups with similar waste-water characteristics; 71 industrial subgroups were identified by SIC code.

3. Develop standardized treatment procedures. For each of the 71 subgroups standardized treatment procedures were developed based primarily on a review of the technical literature; the procedures that were developed, because they can be applied to all establishments, are likely to be high-cost procedures for individual establishments.

4. Describe each establishment in terms of size and location. Since both size and geographic location have a significant impact on water pollution costs, each of the establishments were described in terms of employment and location using the Dun and Bradstreet files.

5. Estimate waste-water discharge per establishment. Having identified the size and location characteristics of the establishments, waste-water discharge was estimated as a function of both size and location. (This procedure estimated a total industry-wide waste-flow that was 93.2% of that reported by the Census Bureau.)

6. Assign a percentage of waste-water discharge to each of the pollution-abatement processes (identified in 3 above). Then, based on a survey of the technical literature, the portion of the waste-water discharge that would be treated by various pollution-abatement processes was assigned.

7. Scale waste-water discharges. Since the strength of the waste of the various industry subgroups varies, scaling factors derived from a review of the technical literature were multiplied times each volume of waste-water discharge to account for these variations (see Table I).

8. Determine pollution-abatement investment required to attain environmental standards. Using the cost-estimating equations described in the following section, the total investment for each industry was estimated; to get the incremental investment required as of the base year, the model was run as a function first of total industry waste-water discharge and second of industry waste-water discharge being treated as of the base year (based on Census of Manufacturers data), and the difference was taken.

9. Compute annual investment. Then annual investment required to bring existing facilities up to standards is scheduled in equal increments from base year to 1976 so that all required investment is made by 1976.

10. Compute growth investment. [illegible] (i.e., pollution-abatement investment required to bring new facilities up to standard). Growth investment is computed as a function of the size of the industry (measured by total investment requirements) where the historical growth rate of the industry is modified by the change in water productivity (the amount of water required to produce a given output).

11. Compute replacement investment. Required replacement investment is computed as a function of capitalization in the previous year where the replacement rate equals the depreciation rate.

12. Compute capitalization (i.e., pollution-abatement investment already made). Then, capitalization in a year is computed as a function of what it was in the previous year plus annual investment plus growth investment plus replacement investment minus depreciation (where for the purposes of the model replacement investment equals depreciation).

13. Compute interest. Interest is computed as a funtion of capitalization where it is assumed that all investments are debt-financed.

14. Compute operations and maintenance costs. These are computed as a function of waste-flow (as were the total investment requirements) using the estimating equations outlined below.

Unit Costs

The costs for individual establishments were computed using cost-estimating equations which expressed costs as a function of the flow of waste-water discharge:

$$\text{Log (cost)} = A + B \log (\text{flow}) + C (\log (\text{flow}))^2$$

Such equations have been developed for eleven different pollution-abatement processes where the parameters were set using regression analysis. Accordingly, after a configuration of processes has been developed for an industry, the costs can be estimated for any establishment in that industry given the waste-water discharge of that establishment. These equations and related parameters are listed in Table II.

TABLE I

| | SCALING FACTORS* |
|---|---|
| Bakeries | 1 |
| Cement | 1 |
| Electric Utilities | 1 |
| Iron Foundries | 1 |
| Fruits and Vegetables | 2 |
| Leather | 4 |
| Primary Non-ferrous | 1 |
| Petroleum | 2 |
| Pulp and Paper - pulp | 6 |
| Paper | 3 |
| Steel | 1 |

* - In scaling the flows for individual industries the scaling factors are used as a simple multiplier - but to the 0.6 power to account for economies of scale.

TABLE II

COST ESTIMATING MODEL

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GENERAL EQUATION: Log (Cost) = A + Log (Flow) [B+C Log (Flow)]

| | | | | ITEMS | | | 1967 Per Million Gallons/Day | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | 0.1 | 1.0 | 10.0 |
| 030212 | 11 | CO | OIL SEPARATION | 4.7478 | 0.0000 | 0.0000 | 10076.91 | 55540.59 | 780514.33 |
| 030213 | 12 | CO | OIL SEPARATION | 2.0422 | -0.1767 | 0.0 | 2833.22 | 15300.01 | 192519.87 |
| 030311 | 11 | CO | EQUALIZATION | 4.6023 | 0.0000 | -0.0000 | 7526.01 | 42268.27 | 234277.41 |
| 030312 | 12 | CO | EQUALIZATION | 0.0000 | 0.0000 | 0.0000 | 100.00 | 1750.00 | 6000.00 |
| 030411 | 11 | CO | STRAINER OR SCREENING | 5.6350 | 0.0000 | 0.0000 | 23000.00 | 221000.00 | 2411337.00 |
| 030412 | 12 | CO | COARSE OR SCREENING | 2.0000 | -0.0000 | 0.0000 | 2000.00 | 20000.00 | 200000.00 |
| 030511 | 11 | CO | NEUTRALIZATION | 4.0000 | 0.0000 | -0.0000 | 5000.00 | 50000.00 | 400000.00 |
| 030512 | 12 | CO | NEUTRALIZATION | 0.0000 | 0.0000 | 0.0000 | 100.00 | 1000.00 | 10000.00 |
| 030611 | 11 | CO | OXIDATION | 4.8438 | 0.0000 | -0.0000 | 25000.00 | 250000.00 | 2500000.00 |
| 030612 | 12 | CO | OXIDATION | 0.0000 | 0.0000 | 0.0 | 2000.00 | 20000.00 | 200000.00 |
| 030711 | 11 | CO | PRECIPITATION | 5.4000 | 0.0000 | 0.0 | 7600.27 | 76000.27 | 760000.27 |
| 030712 | 12 | CO | PRECIPITATION | 0.0000 | -0.0000 | 0.0 | 2000.00 | 20000.00 | 200000.00 |
| 030811 | 11 | CO | ADSORPTION | 4.0000 | 0.0000 | 0.0 | 5000.00 | 50000.00 | 500000.00 |
| 030812 | 12 | CO | ADSORPTION | 0.0000 | 0.0000 | 0.0 | 100.00 | 1000.00 | 10000.00 |
| 030911 | 11 | CO | ION EXCHANGE | -0.2218 | -0.0000 | 0.0000 | 27553.05 | 110000.04 | 522028.00 |
| 030912 | 12 | CO | ION EXCHANGE | 0.0000 | -0.0000 | 0.0000 | 1000.00 | 4000.00 | 20000.00 |
| 031011 | 11 | CO | REVERSE OSMOSIS | 4.0701 | 0.0000 | 0.0 | 3527.77 | 14000.00 | 60000.00 |
| 031012 | 12 | CO | REVERSE OSMOSIS | 0.2430 | -0.1000 | 0.0 | 772.57 | 6139.43 | 42000.00 |
| 031111 | 111 | CO | EVAPORATION | 0.1103 | 1.0000 | 0.0 | 120000.07 | 1200000.75 | 12000007.50 |
| 031112 | 112 | CO | EVAPORATION | -0.0711 | -0.0000 | 0.0 | 530.10 | 2971.21 | 16974.00 |
| 031211 | 111 | CO | INCINERATION 1/ | 6.0000 | 0.0000 | 0.0 | 2100000.00 2/ | 20000000.00 2/ | 380000000.00 3/ |
| 031212 | 112 | CO | INCINERATION 1/ | 1.0000 | -0.0000 | 0.000 | 21000.00 | 200000.00 | 3800000.00 |

C= Capital Cost
CM= Operating and Maintenanced Costs

Illegible and non-reproducible; CEQ unable to furnish better copy

1/ Approximately $000,000 a year of materials recoverable, exclusive of net heat values

2/ Approximately $1,000,000 a year of materials recoverable, exclusive of net heat values

3/ Approximately $6,000,000 a year of materials recoverable, exclusive of net heat values

1/ All incineration numbers are too high by a factor of 10.

BAKERIES

COSTS AND RELATED ASSUMPTIONS FOR THE SIC 205 INDUSTRY

TOTAL COSTS ($millions - August, 1971=100)

Investment 1/

| | 1972 | 1973 | 1974 | 1975 | 1976 |
|---|---|---|---|---|---|
| --Cost to control existing facilities | 2.85 | 2.97 | 3.09 | 3.20 | 3.33 |
| --Costs to control new facilities | .07 | .07 | .07 | .07 | .07 |
| --TOTAL | 2.92 | 3.04 | 3.16 | 3.27 | 3.40 |

Annual 2/

| | | | | | |
|---|---|---|---|---|---|
| --Operation and Maintenance | .10 | .21 | .32 | .43 | .54 |
| --Interest | .18 | .36 | .53 | .71 | .90 |
| --Depreciation | .12 | .23 | .35 | .46 | .58 |
| --TOTAL | .40 | .80 | 1.20 | 1.60 | 2.02 |

Total 3/

| | | | | | |
|---|---|---|---|---|---|
| --Total Cash | 3.20 | 3.61 | 4.01 | 4.41 | 4.84 |
| --Total Direct | 3.02 | 3.25 | 3.46 | 3.70 | 3.94 |

Uncertainty

Figures above are EPA's estimates of highest possible costs associated with assumptions outlined below, and EPA expects the real costs to be lower. However, other credible sources estimated the costs could be higher. Accordingly, a reasonable range is from - 25 % to + 35 %.

The figures could reasonably be 25 % lower because:

a. Treatment can be accomplished largely through municipal systems (15%)

b. Lower cost treatment configurations (10%)

The figures could reasonably be 35 % higher because:

a. Current level of control could be only 40% instead of 50%

b. Some localities may set standards that require additional treatment like activated charcoal (10%)

c. Water productivity may currently be declining (5%)

d. There may be many small bakeries that weren't included in the industry calculation (10%)

UNIT COSTS ($millions - August, 1971=100)

| | Type of Plant 4/ | | | | |
|---|---|---|---|---|---|
| | A | B | C | D | E |
| Investment * | | | | | |
| --Cost to control existing facility | .202 | .706 | 2.500 | ——— | ——— |
| —Cost to control new facility | .202 | .205 | 2.500 | | |
| —Total | .202 | .705 | 2.500 | ——— | ——— |
| Annual | | | | | |
| —Operations and maintenance | .009 | .051 | .339 | ——— | ——— |
| —Interest | .015 | .054 | .192 | ——— | ——— |
| —Depreciation | .010 | .035 | .125 | ——— | ——— |
| --Total | .034 | .140 | .656 | ——— | ——— |
| Total | | | | | |
| —Total Cash | .226 | .811 | 3.031 | ——— | ——— |
| —Total Direct | .211 | .757 | 2.839 | ——— | ——— |
| Uncertainty | | | | | |
| —Upper bound | 50 | 50 | 50 | 50 | 50 |
| —lower bound | 50 | 50 | 50 | 50 | 50 |

* - Bakeries could pay higher sewer charges in lieu of treatment facilities, to a maximum of $0.10 per 100 gallons.

The figures could reasonably be higher because:

a. High regional construction costs

| | |
|---|---|
| Northeast | 20% |
| Great Lakes | 18% |
| Northern Plains | 14% |

b. Some localities may set standards that require additional treatment like activated charcoal (30%)

The figures could reasonably be lower because:

a. Lower regional construction costs

| | |
|---|---|
| Pacific Coast | 32% |
| Southwest | 29% |
| Southern Plains | 34% |
| Southeast | 18% |

b. Many facilities can discharge to municipal systems (30%)

c. Lower-cost treatment configurations are available (30%)

ASSUMPTIONS

1. Standard

Equivalent of secondary treatment (see assumption #3)

2. Current level of control

a. Relative to industry costs

Industry pollution-abatement facilities have a current replacement value (in August, 1971 dollars) of $9.3 million as compared to a total requirement of $20.6 million.

b. Relative to unit costs

Zero current level of control.

3. Abatement technology (by type of plant)

| Method | % process wasteflow |
|---|---|
| equalization | 50 |
| flotation | 100 |
| sedimentation | 100 |
| stabilization | 100 |

4. Interest Rate: 7.7%

5. Growth Rate: 2.8% production, 2.5% water productivity

6. Depreciation Rate: 5%

7. Down-time: installation multiple = 1.20

8. Phasing:

The costs associated with air standards are derived from the Cost of Clean Air figures which are computed as total cumulative investment required by 1976 and as annual costs in 1976. Accordingly, the investment costs are phased over the five years -- 5%, 10%, 35%, 40%, 10% -- and the annual costs are phased -- 5%, 15%, 50%, 90%, 100%.

The costs associated with water standards are phased on the straight line basis from 1971 to 1976.

## FOOTNOTES

1/ These costs include the direct incremental investment required to attain environmental standards (i.e., for investment required to attain standards in addition to investment that had already been made prior to and during 1971). These costs include control equipment, auxiliary equipment, buildings, land, and down-time (i.e., the opportunity costs associated with stopping production to install, modify, or replace pollution abatement equipment). The investment costs to control existing facilities include all those costs required to enable existing facilities to attain (and continue to attain) environmental standards while maintaining the 1971 level of production. The investment costs to control new facilities include the additional investment required to attain environmental standards over and above what the cost of the facility would have been without the standards.

The costs to control existing facilities may be overstated for two reasons. First, a firm may choose to build a new facility rather than modify an old one. Second, a firm may choose to curtail production rather than absorb the costs required to maintain production. Accordingly, the costs reported above may err on the high side since a firm presumably would not build a new plant or curtail production if it were not the least expensive alternative.

2/ These costs include the incremental operating expenses (i.e., for expenses required to attain and maintain standards in addition to expenses already being incurred during base year) associated with attaining and maintaining environmental standards net of any productivity increases or by-product revenues associated with pollution abatement investments.

3/ Total cash costs equal investment costs plus annual costs minus depreciation. Total direct costs equals total cash costs minus interest.

4/ All costs are a function of waste-flow

| Type | Waste-water Discharge (mgd) |
|---|---|
| A | 0.1 |
| B | 1.0 |
| C | 10.0 |

(Smallest bakeries could pay higher sewer charges -e.g., $0.10 per 100 gallons surcharge.)

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# APPENDIX B

# SUPPORTING INFORMATION

# SUPPORTING INFORMATION

## INTRODUCTION

Throughout the three reports frequent reference is made to various industry characteristics such as degree of concentration, amount of foreign trade, capitalization, etc. The purpose of this appendix is to supply documentation in support of the characteristics specified in the areas of:

- Water discharge information
- Establishment size
- Distribution of bakery operations
- Demand elasticity for bakery products
- Economies of scale in baking
- Economies of automation in baking

To provide a frame of reference a table of industry statistics (Table B-1) follows.

TABLE B-1

SELECTED STATISTICS FOR THE BAKERY INDUSTRY*

Bread and Related Products (SIC 2051)

| Year | Number of establishments | Number of employees (thousands) | Number of production workers (thousands) | Cost of materials ($ millions) | Value of shipments ($ millions) | Capital expenditures ($ millions) | Exports** as a percentage of shipments |
|---|---|---|---|---|---|---|---|
| 1970 | 4042 | 218.3 | 125.2 | -- | 5571 | -- | .1 |
| 1969 | 4049 | 220.7 | 126.0 | -- | 5419 | -- | .1 |
| 1968 | -- | 219.5 | 124.9 | -- | 5242 | -- | -- |
| 1967 | 4042 | 221.7 | 125.3 | 2349.5 | 5102.6 | 127.9 | -- |
| 1966 | -- | 231.8 | 127.9 | 2349.0 | 5007.2 | 148.6 | -- |
| 1965 | -- | 235.5 | 130.0 | 2209.4 | 4709.1 | 142.0 | -- |
| 1964 | -- | 234.2 | 127.3 | 2159.0 | 4618.2 | 115.0 | -- |
| 1963 | 5010 | 237.0 | 129.9 | 2103.1 | 4506.0 | 95.3 | -- |
| 1962 | -- | 254.2 | 137.2 | 2106.6 | 4446.3 | 92.6 | -- |
| 1961 | -- | 255.5 | 140.5 | 2076.5 | 4365.2 | 96.4 | -- |
| 1960 | -- | 260.4 | 144.0 | 2059.1 | 4332.9 | 101.9 | -- |
| 1959 | -- | 260.7 | 146.6 | 2027.5 | 4266.6 | 127.2 | -- |
| 1958 | 6026 | 257.8 | 145.9 | 1995.0 | 4098.6 | 104.1 | -- |

TABLE B-1

SELECTED STATISTICS FOR THE BAKERY INDUSTRY*

Bread and Related Products (SIC 2051)

| Cost of materials ($ millions) | Value of shipments ($ millions) | Capital expenditures ($ millions) | Exports** as a percentage of shipments | Imports as a percentage of consumption | Return** on sales (percent) | Return on Investment (percent) |
|---|---|---|---|---|---|---|
| -- | 5571 | -- | .1 | .5 | -- | -- |
| -- | 5419 | -- | .1 | .54 | 2.5 | 10.2 |
| -- | 5242 | -- | -- | -- | 3.2 | 13.4 |
| 2349.5 | 5102.6 | 127.9 | -- | -- | -- | -- |
| 2349.0 | 5007.2 | 148.6 | -- | -- | -- | -- |
| 2209.4 | 4709.1 | 142.0 | -- | -- | -- | -- |
| 2159.0 | 4618.2 | 115.0 | -- | -- | -- | -- |
| 2103.1 | 4506.0 | 95.3 | -- | -- | -- | -- |
| 2106.6 | 4446.3 | 92.6 | -- | -- | -- | -- |
| 2076.5 | 4365.2 | 96.4 | -- | -- | -- | -- |
| 2059.1 | 4332.9 | 101.9 | -- | -- | -- | -- |
| 2027.5 | 4266.6 | 127.2 | -- | -- | -- | -- |
| 1995.0 | 4098.6 | 104.1 | -- | -- | -- | -- |

(cont'd)

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TABLE 3-1 (cont'd)

SELECTED STATISTICS FOR THE BAKERY INDUSTRY*

Biscuits and Crackers (SIC 2052)

| Year | Number of establishments | Number of employees (thousands) | Number of production workers (thousands) | Cost of materials ($ millions) |
|---|---|---|---|---|
| 1970 | 348 | 45.5 | 36.5 | -- |
| 1969 | 316 | 41.8 | 33.1 | -- |
| 1968 | -- | 42.5 | 34.4 | -- |
| 1967 | 348 | 42.5 | 34.2 | 623.6 |
| 1966 | -- | 42.5 | 34.1 | 620.2 |
| 1965 | -- | 42.4 | 33.9 | 563.7 |
| 1964 | -- | 42.2 | 33.4 | 540.8 |
| 1963 | 356 | 43.2 | 34.1 | 523.3 |
| 1962 | -- | 42.4 | 33.2 | 516.1 |
| 1961 | -- | 42.8 | 33.4 | 483.0 |
| 1960 | -- | 43.4 | 33.8 | 478.4 |
| 1959 | -- | 44.9 | 33.8 | 458.7 |
| 1958 | 339 | 44.5 | 34.3 | 456.8 |

* Census of Manufacturers, 1967, and US Industrial Outlook, 1971, US Department of Commerce

** Includes biscuit and cracker industry figures

A

TABLE 3-1 (cont'd)

SELECTED STATISTICS FOR THE BAKERY INDUSTRY*

Biscuits and Crackers (SIC 2052)

| ber of loyees ousands) | Number of production workers (thousands) | Cost of materials ($ millions) | Value of shipments ($ millions) | Capital expenditures ($ millions) |
|---|---|---|---|---|
| 45.5 | 36.5 | -- | 1577 | -- |
| 41.8 | 33.1 | -- | 1511 | -- |
| 42.5 | 34.4 | -- | 1427 | -- |
| 42.5 | 34.2 | 623.6 | 1363.8 | 24.0 |
| 42.5 | 34.1 | 620.2 | 1327.3 | 33.2 |
| 42.4 | 33.9 | 563.7 | 1235.6 | 30.9 |
| 42.2 | 33.4 | 540.8 | 1197.8 | 15.3 |
| 43.2 | 34.1 | 523.3 | 1150.1 | 26.4 |
| 42.4 | 33.2 | 516.1 | 1134.1 | 38.0 |
| 42.8 | 33.4 | 483.0 | 1073.9 | 14.2 |
| 43.4 | 33.8 | 478.4 | 1051.3 | 12.7 |
| 44.0 | 33.8 | 458.7 | 998.0 | 14.5 |
| 44.5 | 34.3 | 456.8 | 982.5 | 15.5 |

nd US Industrial Outlook, 1971, US Department of Commerce
ustry figures

B

WATER DISCHARGE

It should be noted that the figures shown in Table B-2 correspond to 7.7 million gallons per day (mgd) discharge in each industry. Thus the largest plant considered in the cost model, a 10 mgd discharge plant, is impossible.

TABLE B-2

Water Discharge in the Bakery Industry*
(billion gallons/yr)

| | 1968 | 1964 | 1959 | 1954 |
|---|---|---|---|---|
| Bread and related products (SIC 2051) | 2 | 2 | 2 | 2.5 |
| Biscuit and crackers (SIC 2052) | 2 | 2 | 2 | 2.5 |

* Census of Manufacturers, 1968, 1964, 1959, 1954, US Department of Commerce

TABLE B-3

ESTABLISHMENT SIZE* (1967)

| Average number of employees | Number of establishments** | Value of shipments ($ millions) |
|---|---|---|
| | Bread and Related Products Industry (SIC 2051) | |
| All | 4042 | 5102.7 |
| 1-4 | 1594 | 62.8 |
| 5-9 | 382 | 46.9 |
| 10-19 | 458 | 96.2 |
| 20-49 | 555 | 297.6 |
| 50-99 | 358 | 551.5 |
| 100-249 | 487 | 1894.5 |
| 250-499 | 158 | 1326.5 |
| 500-999 | 42 | 633.7 |
| 1000-2499 | 8 | 197.9 |
| | Biscuit and Cracker Industry (SIC 2052) | |
| All | 348 | 1363.8 |
| 1-4 | 72 | 2.9 |
| 5-9 | 35 | 4.3 |
| 10-19 | 41 | 9.4 |
| 20-49 | 70 | 51.5 |
| 50-99 | 46 | 79.7 |
| 100-245 | 45 | 200.0 |
| 250-499 | 14 | 124.5 |
| 500-999 | 19 | 477.0 |
| 1000-or more | 6 | 414.4 |

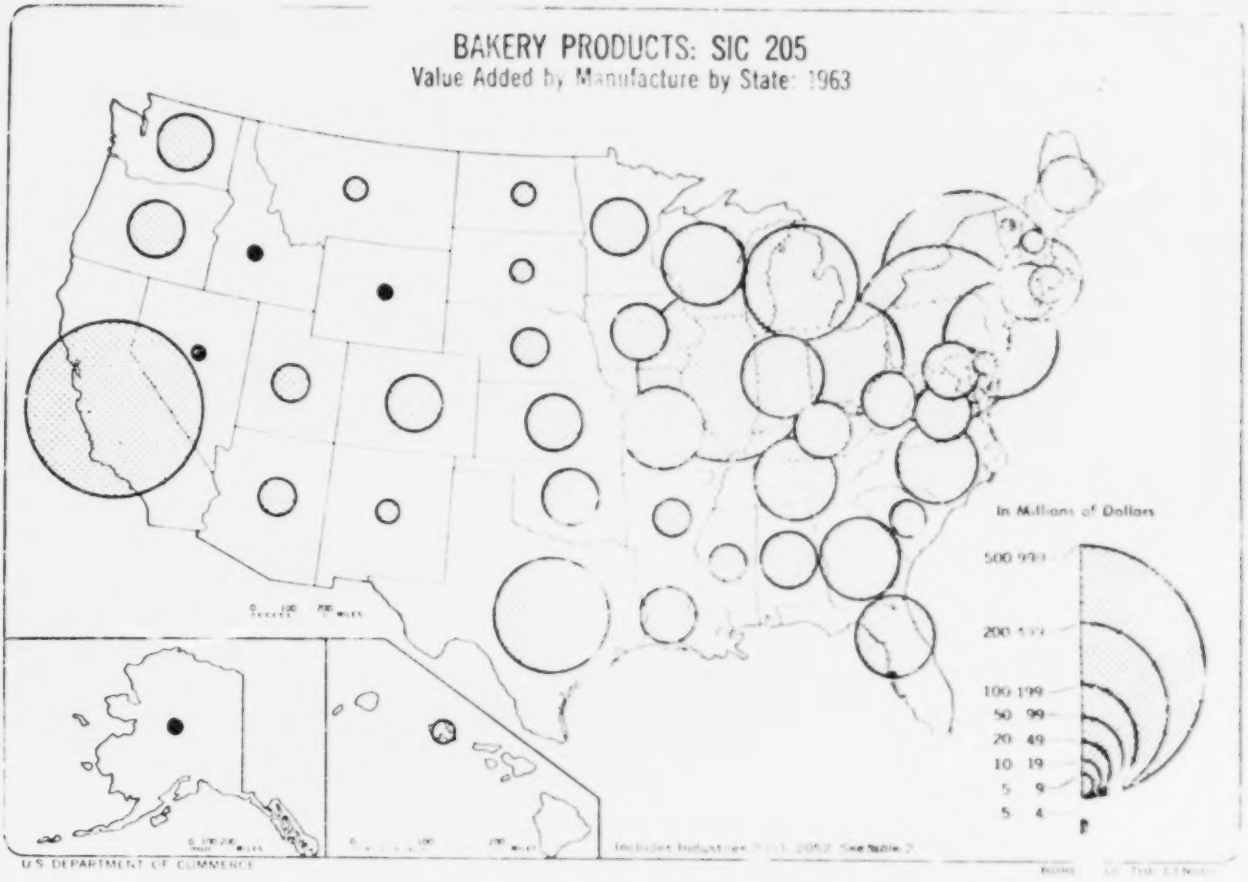
* Census of Manufacturers, 1967, US Department of Commerce

** An establishment is defined as a manufacturing operation at a single locati

DISTRIBUTION OF BAKERY OPERATIONS

The map shown below (Figure B-1) illustrates the distribution of bakery output across the US. It can readily be seen that the amount of value added corresponds to population concentration.

FIGURE B-1



DEMAND ELASTICITY

Bakery products satisfy all of the requirements characteristic of a product with inelastic demand: they occupy a small proportion of the consumer's expenditure, they are a product with few close substitutes, and they are a "necessity."

Several studies to investigate the elasticity of demand for bakery products have found the elasticity to be low, (or inelastic). Table B-4 (reprinted) shows the results of some of these studies as compiled by Slater☆.

TABLE B-4

ELASTICITY OF DEMAND FOR BAKERY PRODUCTS

| | *Price Elasticity* | | *Income Elasticity* | |
|---|---|---|---|---|
| *Item* | *U.K. 1920–1938* | *U.S.A. 1923–1947* | *U.K. 1920–1938* | *U.S.A. 1923–1947* |
| Bread[a] | −.08 (±.07)[c] | | −.05 (±.04) | |
| Cakes and Biscuits[a] | −.74 (±.20) | | .73 (±.13) | |
| All Bakery Products[b] | | −.60 | | .40 |
| All Food[a] | −.35 (±.28) | | .53 (±.04) | |

[a] Richard Stone, *The Measurement of Consumers' Expenditures and Behavior in the United Kingdom, 1920–1938*, Volume I (Cambridge, England, 1954), pp. 106 and 331.

[b] K. W. Meinken, *The Demand and Price Structure for Wheat*, U. S. Department of Agriculture Technical Bulletin 1136 (Government Printing Office, 1956).

[c] Figures in parentheses are standard errors.

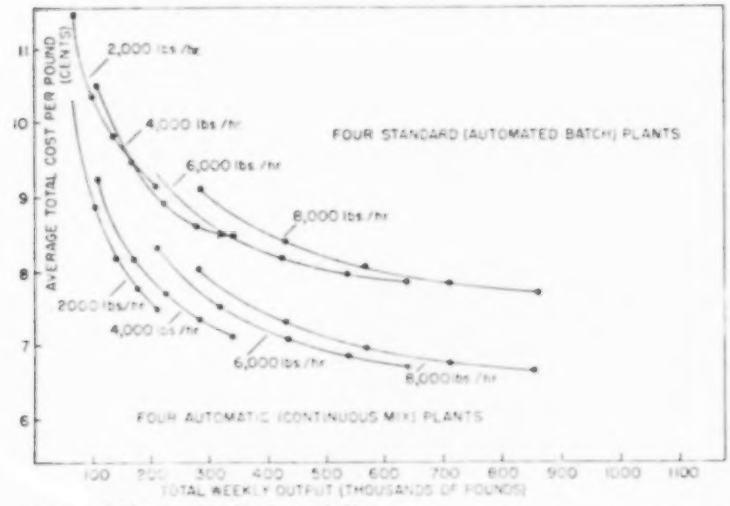
Present-day elasticities are not likely to be higher than during the time periods shown, as home baking, which was then an alternative, is no longer widespread.

☆ Slater, Charles, Baking in America, Northwestern University Press, Evanston, Illinois, 1956

ECONOMIES OF SCALE AND AUTOMATION

Although operations below full capacity (the average was 80 percent of full utilization in 1965), advertising expenses, etc., tend to equalize bread prices, the potential for economies of scale does exist. Walsh and Evans☆ estimated the average total cost curves for model bakeries of varying sizes, as shown in Figure B-2 here reproduced.

FIGURE B-2




Source: Tables 29, 30, 31, 34, and 35.

FIG. 2.—Comparison of average total cost curves for model bread plants with standard and with automatic equipment, operated under conditions of average daily variation in demand, 1959

The existance of scale economies is also substantiated by the prices for bakery equipment. The American Bakers Institute provided the following equipment cost figures and yearly cost of equipment as compared with savings of labor costs (Tables B-5 and B-6, reproduced following).

---

☆ Walsh and Evans, Economies of Change in Market Structure, Conduct, and Performance: the Baking Industry 1947-1958, Lincoln, Nebraska, 1963, p 56.

TABLE B-5

APPROXIMATE INSTALLED EQUIPMENT COST

FOR BREAD PRODUCTION

| Production Rate of 1 lb. Loaves/Hr. | 4,000 | 6,000 | 8,000 | 10,000 | 12,000 |
|---|---|---|---|---|---|
| Standard Equipment | | | | | |
| *Bread Pans | $48,000 | $69,000 | $91,000 | $114,750 | $135,000 |
| Pneumatic Flour Handling Equipment | 78,000 | 95,000 | 110,000 | 135,000 | 160,000 |
| Fermentation Room Do-Tros & Hoist | 32,000 | 40,000 | 52,500 | 60,000 | 80,000 |
| Mixers & Ingredient Equipment | 90,500 | 130,500 | 190,000 | 228,300 | 266,000 |
| Divider, Rounder, O.H. Proofer & Moulder-Panner | 54,000 | 67,000 | 74,000 | 79,000 | 100,000 |
| Proof Box, Monorail and Racks | 34,500 | 45,700 | 59,000 | 70,700 | 84,000 |
| Oven | 84,000 | 107,000 | 131,000 | 161,000 | 200,000 |
| Slicers, Wrappers Conveyors to Loading Racks | 61,000 | 95,000 | 100,000 | 135,000 | 170,000 |
| Total Investment in Standard Equipment | 482,000 | 649,200 | 807,700 | 983,750 | 1,195,000 |
| Addition of Depanner & Pan Return Conveyor | 22,000 | 25,000 | 28,000 | 31,000 | 34,000 |
| Addition of Slicers, Baggers & Conveyors to Loading Racks in Place of Wrappers | 56,000 | 74,000 | 79,000 | 107,000 | 135,000 |
| Addition of Bulk Liquid Sugar System | 10,500 | 10,500 | 14,000 | 14,000 | 16,000 |
| Addition of Bulk Liquid Shortening System | 10,000 | 10,000 | 13,000 | 13,000 | 15,000 |
| Addition of Bread Cooler & Conveyors | 59,000 | 79,000 | 108,000 | 120,000 | 144,000 |
| Addition of Pan Stacker & Unstacker | 35,000 | 45,000 | 50,000 | 55,000 | 60,000 |
| Addition of Final Proofer | 89,000 | 109,000 | 148,000 | 170,000 | 200,000 |
| Total Cost Fully Automated Plant | 707,000 | 927,700 | 1,168,700 | 1,386,750 | 1,664,000 |

*Bread pans. Sufficient for a complete cycle of three varieties. Two open top

TABLE B-6

APPROXIMATE YEARLY COST OF EQUIPMENT VS SAVING OF LABOR COST

FOR BREAD PRODUCTION

| Production Rate of 1 lb. Loaves/Hr. | 4,000 | 6,000 | 8,000 | 10,000 | 12,0 |
|---|---|---|---|---|---|
| Standard Equipment | $482,000 | $649,000 | $807,700 | $983,750 | $1,195,0 |
| Addition of Depanner & Pan Return Conveyors | 22,000 | 25,000 | 28,000 | 31,000 | 34,000 |
| interest @ 6% | 1,320 | 1,500 | 1,680 | 1,860 | 2,040 |
| depreciation @ 5% | 1,100 | 1,250 | 1,400 | 1,500 | 1,700 |
| yearly cost of equipment | 2,420 | 2,750 | 3,080 | 3,360 | 3,740 |
| yearly saving of labor cost | 10,000 | 15,000 | 15,000 | 15,000 | 20,000 |
| yearly profit (1 shift) | 7,580 | 12,250 | 11,920 | 11,640 | 16,260 |
| yearly profit (2 shifts) | 17,580 | 27,250 | 26,920 | 27,640 | 36,260 |
| Addition of Bread Cooler & Conveyors to Slicers | 59,000 | 79,000 | 108,000 | 120,000 | 144,000 |
| interest @ 6% | 3,540 | 4,740 | 6,480 | 7,200 | 8,640 |
| depreciation @ 5% | 2,950 | 3,950 | 5,400 | 6,000 | 7,200 |
| yearly cost of equipment | 6,490 | 8,690 | 11,880 | 13,200 | 15,840 |
| yearly savings of labor cost | 10,000 | 10,000 | 20,000 | 20,000 | 20,000 |
| yearly profit (1 shift) | 3,510 | 1,310 | 8,120 | 6,800 | 4,160 |
| yearly profit (2 shifts) | 13,510 | 11,310 | 28,120 | 26,800 | 24,160 |
| Addition of Pan Stacker and Unstacker | 35,000 | 45,000 | 59,000 | 59,000 | 60,000 |
| interest @ 6% | 2,100 | 2,700 | 3,000 | 3,000 | 3,600 |
| depreciation @ 5% | 1,750 | 2,250 | 2,500 | 2,750 | 3,000 |
| yearly cost of equipment | 3,850 | 4,950 | 5,500 | 6,050 | 6,600 |
| yearly saving of labor cost | 5,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| yearly profit (1 shift) | 1,150 | 5,010 | 4,500 | 3,950 | 3,400 |
| yearly profit (2 shifts) | 6,150 | 15,010 | 14,500 | 13,950 | 13,400 |
| Addition of Final Proofer | 89,000 | 109,000 | 148,000 | 170,000 | 200,000 |
| interest @ 6% | 5,340 | 6,540 | 8,880 | 10,200 | 12,000 |
| depreciation @ 5% | 4,450 | 5,450 | 7,400 | 8,500 | 10,000 |
| yearly cost of equipment | 9,790 | 11,990 | 16,280 | 18,700 | 22,000 |
| yearly saving of labor cost | 15,000 | 25,000 | 25,000 | 25,000 | 25,000 |
| yearly profit (1 shift) | 5,210 | 13,010 | 8,720 | 6,300 | 3,000 |
| yearly profit (2 shifts) | 20,210 | 38,010 | 33,720 | 43,300 | 28,0 |
| *Addition of Bulk Liquid Sugar System | 10,500 | 10,500 | 14,000 | 14,000 | 16,000 |
| interest @ 6% | 630 | 630 | 840 | 840 | 960 |
| *Addition of Bulk Liquid Shortening System | 10,000 | 10,000 | 13,000 | 13,000 | 15,000 |
| interest @ 6% | 600 | 600 | 780 | 780 | 900 |

*Not practical unless system can pay for themselves in not more than three years. Savings are in ingredient cost.